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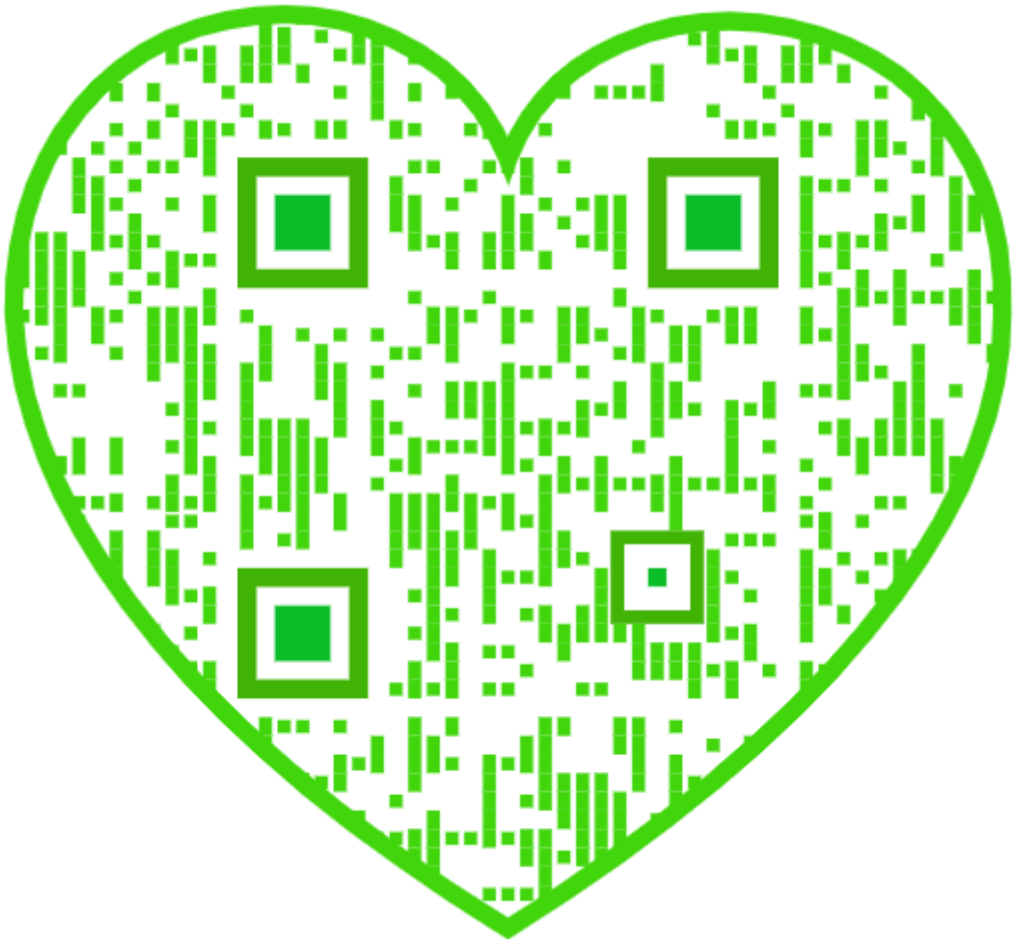
THE FARM
AND THE
WOODLOT

BY J. E. BARTON
STATE FORESTER OF KENTUCKY
FRANKFORT



Black locust grove in pasture on poor soil. Seed sown in plowed land, in rows four feet apart. Nine years ago cultivated one year, and since thinned twice. 197 trees on one-half acre will make 514 posts (7′—3″). Photo by U. S. Forest Service.

The Farm and the Woodlot

By J. E. BARTON,
State Forester of Kentucky.

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THE FARM AND THE WOODLOT

INTRODUCTION.

Undoubtedly, one of the most important phases of the forestry work, so far as the individual States are concerned, is the question of the woodlot and its improvement. In the Eastern States—that is, those east of the Mississippi River—a very considerable portion of the forested areas within each State is in the form of woodlots which are a part of and an adjunct to the farm so that in any comprehensive forest policy for the Eastern United States a great deal of attention must be focused upon this phase of the work. This is, undoubtedly, true so far as Kentucky is concerned where, as a whole, the land is held in fee simple by the citizens of the State as farms from a few acres in size up to several thousand acres. By the majority of the owners of these farms, the value and importance of the woodlot is little understood nor has the practice of forestry as it applies to these woodlots any significance whatsoever. The object of this bulletin is to make clear just what forestry is, the relation of scientific forestry to the improvement of the woodlot and the economical part which the farm woodlot plays in the industrial and social welfare of the State. As a matter of fact, this is one of the most difficult features of the work to present properly, because it is a hard matter to make clear to the average individual just why a woodlot is an asset in connection with his property and how the improvement and care of his woodlot concerns him closely and means a proportional increase directly in the actual money value of the material on hand and indirectly in ways which do not present themselves readily unless the attention is focused on them—as for example, the value of a woodlot as a wind-break in connection with an orchard or in connection with the farm as a whole, or the value of a wooded area on an

easily eroded hillside as a fixative for the soil and a preventative against the deterioration of the cultivated areas below it. The effort then of this bulletin will be—first, to show how the average woodlot may be brought to a standard of productivity compatible with the complete utilization of the ground, and second, to show in detail what the direct and indirect benefits of a woodlot in connection with any farm will be under the best circumstances. In the preparation of this bulletin, free use has been made of all bulletins and publications on this subject, which the writer has been able to get hold of and acknowledgment is made to these as a whole, since it would be impracticable to make complete individual acknowledgement.

WHAT IS FORESTRY?

To the average individual, forestry as a science does not mean very much. The impression is that it has to do with the trees, but to what extent and how it deals with this question is by no means thoroughly understood. In the first place, forestry deals with trees as a community and not as an individual —that is, it deals with them in the bulk and in this respect differs from kindred sciences where the individual tree is a matter of concern. The forester is often called upon to answer questions and discuss matters with relation to shade trees or ornamental trees, but this is not a matter within his province properly, but is a matter for the landscape architect or horticulturist. Forestry primarily concerns itself with the planting and growing of trees for sale at a profit. Occasionally forestry may concern itself with the growing and raising of trees for purposes where the money value of the crop, while it may not be as evident as where the trees are placed on the market and sold, is nevertheless, a real money consideration. This is the case, where certain areas are planted for the purification and conservation of a city water supply. Here the actual worth of the forest is the value to the people of the city or community of pure drinking water. This will be the case in the Catskill Mountains where enormous expenditures are being made for supplying New York City with pure water

and where the purity of this water supply depends upon the maintenance of certain areas in forest growth. Forestry then, so far as it relates to the farm and woodlot, may be defined as dealing with trees as communities and the growing and marketing of these trees for a profit. It is a simple proposition, the same as raising corn. In raising corn, the ground is prepared, the seed is planted at a certain time in the spring, the necessary attention is given during the growing season and in the fall it is harvested and sold. A certain price is obtained for the grain and a certain price for the stalks, usually in the form of fodder for stock. The chief value of the corn crop depends upon the number of bushels per acre of corn (grain) that have been produced and the kind and quality of corn there is to market. The kind and quality of the corn crop depends on the selection of seed. All this is accomplished within a year's time—the planting, the harvesting, the cultivation and the sale of the product. Forestry is exactly the same proposition. The stock is selected, the trees are planted, the necessary attention is given them during the growing period, and eventually the crop is harvested and marketed for the best price obtainable. The value of the timber crop depends on how much material you raise to the acre, the kind and quality of the product you have to market and the demand in the market for the class of material to which the timber crop is particularly adapted. The chief difference is this: that, whereas, the corn crop has been planted, harvested and marketed within one growing season, a forest crop takes a period of growing seasons before it is ready to market. The precise length of this period depends on the kind of material you are to raise, as fence posts, ties, lumber, etc.

IMPROVEMENT OF THE WOODLOT.

What then can be done to show the man most concerned, the farmer, the importance of the improvement of his woodlot? First, an attempt will be made to set forth the matter as clearly as possible in print, which is the object of this bulletin; and the necessary steps will then be taken to furnish an ocular demonstration of the facts herein set forth by the

establishment of nurseries and the maintenance of model woodlots. On the big majority of farms in Kentucky, there are certain areas which are not good farm land and never will be for a variety of reasons(inferior soil, rocky soil, too steep a slope, etc.) ; but these lands in most cases can produce timber crops and should be producing them, since they are a commercial adjunct to the farm and bring in a revenue. As Mr. W. F. Cook, of Hickman County, says, "It is a great deal more valuable than giving the land over to weeds and wild briars."

Ordinarily, there is little or no attention paid to the woodlot on a farm, and without attention a woodlot is in much the same condition as a corn field in which no attention was paid to the kind of corn planted, and which was not cultivated during the growing season. You commonly find in a woodlot a great variety of trees, some of a valuable species and some of more or less worthless species. You also find crooked and defective and diseased trees, and further you ordinarily do not find in any particular woodlot one-half the trees that the ground will support, which is about the worst feature of all, since here is an economic waste.

PURPOSES OF THE WOODLOT.

When the improvement of the woodlot is seriously under consideration, one of the first propositions is to determine just what purpose the woodlot will serve in the economy of the farm. Ordinarily a woodlot will be maintained for the following reasons: 1. To furnish fence posts; 2. To furnish fuel; 3. As a shelter belt for certain areas or for the whole farm; 4. As a protection on steep up-lands against erosion; 5. As a means of regeneration of worn out land; 6. As an investment pure and simple, without regard to immediate returns; 7. For the aesthetic value. Any combination of these reasons may prevail for the maintenance of a woodlot; however, each one of them will be discussed in its turn as separate propositions.

1. Probably one of the chief reasons for maintaining the woodlot on farms in Kentucky from the purely utilitarian standpoint will be to obtain fence posts. These are a commod-

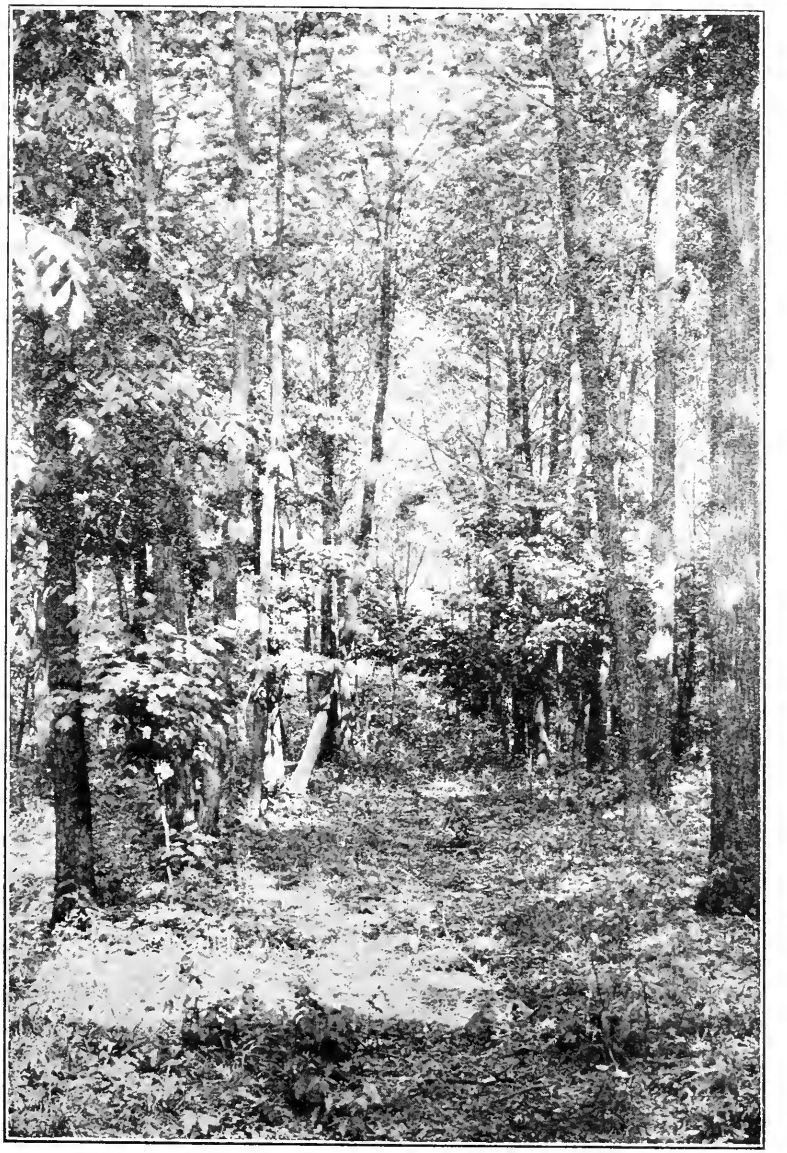
ity on the farm which cannot be dispensed with and for which the demand is staple. Concrete may and will at some future date, supersede wood as fence posts, especially in rich easily accessible agricultural regions where farming is very profitable and conducted as a business, but it will do this only slowly in remote regions, and at the present time concrete posts are not extensively used in any locality. A woodlot can then be reasonably maintained for the production of fence posts. Ordinarily the posts are largely consumed on the home farm, since they are more valuable to the producer at this point than if he should sell them; however, if there is a surplus, a market for this will not be lacking and the price obtained will more than justify the cost of the establishment of the woodlot and its maintenance up to the time of harvesting the crop. In considering the species which lend themselves most readily to the production of this class of products in Kentucky, undoubtedly, black locust (Robinia pseudacacia) sometimes locally called yellow locust, lends itself most readily to this purpose. It is indigeneous to the State, grows fairly rapidly and lasts a long time in contact with the soil, three prime requisites of any species which is to be used in the growing of this class of material. Other species which may be used are catalpa (Catalpa speciosa) walnut, osage orange, chestnut and juniper (also known locally as cedar or red cedar).

2. As a general proposition, it appears that the maintenance of a woodlot for the growing of fuel, so far as Kentucky is concerned, is not an important consideration. So far as my observation goes throughout the State—even in the rural districts—coal is the general fuel in use on account of the abundance of supply and is in a large number of ways cheaper and preferable to wood as a fuel. On this account the woodlot will supply only a very small amount of fuel and consideration of this matter is not important. If it does happen that a supply of fuel wood is desirable or necessary on the farm, undoubtedly, hickory and oak lend themselves most readily for this purpose. Any species of hickory grows fairly rapidly, and certain species of oak, as for instance red

oak, makes a reasonably rapid growth. A woodlot for this purpose would be managed as a sprout forest.

3. The removal of forests and wooded areas of Kentucky has undoubtedly resulted in certain climatic changes. These are principally to be noticed in the prevalence of high winds which formerly did not exist, and such winds have a marked effect on certain farm activities, as for instance the handling of an orchard or the handling of stock. A shelter belt, therefore, offers protection to the farm house and surrounding buildings. To be of use, the shelter belt or wind break must be in the direction of the prevailing winds. Further, since in all probability a shelter belt is of most use and is most desirable in the winter time, the component species in the shelter belt should be, to a large extent, evergreens, so that the effectiveness may be as great in winter as in summer. In connection with an orchard, a shelter belt or wind break, undoubtedly, protects against cold and destructive currents of air which injure the orchard in various ways either by injuring the blossoms of the fruit, or at a later period, by injuring the fruit, which is blown from the trees by the wind and left in bad condition for shipping.

The species then which should compose a shelter belt should, as far as posible, have these characteristics. They should grow fast to furnish the maximum amount of protection in the shortest space of time, and should have as wide a usefulness as possible. So far as the majority of instances are concerned, the shelter belt might have two objects. The production of useful material for the farm as fence posts as well as a wind break. In this case, it would be well to plant black locust in conjunction with some evergreens, as white pine or Norway spruce, hemlock or yellow pine. The number of evergreens which may be utilized for this purpose in Kentucky are limited, but the number of hardwoods which lend themselves to this purpose is very great, as for instance, the hickories, ashes, black locust, poplars, tulip poplar, osage orange and others. Beech also makes a good tree for the composition of a shelter belt.



Chestnut plantation, thirty years old. Photo by U. S. Forest Service.

4. As a protection on a steep up-lands against erosion, the chief thing is to establish a forest cover. The composition of the stand is more or less immaterial although it is always desirable that the most readily marketable species shall be used so that the woodlands in addition to performing their protective function may also supply an actual revenue. Therefore, as far as possible, the trees to be used should be the ashes, oak, chestnut, hickories, maples and other species, whose value in the lumber market is standard. The chief feature in regard to this protective woodland is that the forest cover shall remain unbroken.

5. As a means of regeneration of worn out land, especially hillsides, which are liable to erosion and do not lend themselves easily to a scientific rotation of crops, a forest cover is a very important factor since it furnishes to the soil the essential humus and, when such species as the black locust or honey locust are planted, it furnishes the nitrogenous elements to the soil, since the locusts are legumes and produce on their roots nodules of nitrifying organisms similar to those found on the roots of alfalfa, cow-peas or soy beans.

6. As a general proposition, the raising of lumber or timber by an individual is out of the question on account of the length of time which it takes to grow the better grades of this material. Ordinarily, a tree fifty years old will furnish only the poorest grades of lumber and usually only small dimension stock. Generally speaking, one hundred years is not too small a calculation for the length of rotation when lumber is the aim. In the event that any individual plants trees for the production of the lumber, such planting is done as an investment purely and simply since he can not expect to see the crop harvested within his life time. The only monetary benefit that could possibly accrue to the owner is from the material which may have to be thinned out or in the event that he should desire to sell his farm when the existence of a grove or woodland of healthy young trees would represent an actual money value to the purchaser. In case planting for this reason is made, the trees should be those which are the most valuable lumber producing species, as for instance, the oaks,

the ashes, hickory, sweet gum, tulip poplar, white and yellow pines, basswood and a few others.

7. It may be that in connection with the farm the presence of a grove of trees thereon will represent a value from the aesthetic and science standpoint where the beauty of the landscape is a matter of consideration to the owner of the land, or to any one who might desire to purchase it. In this event the kind of tree is not so important as the actual presence of trees of some kind. The general effect is the main consideration, without regard to the individual features which compose this effect.

FOREST TAXATION.

One of the most important factors in connection with the consideration of woodlots is the matter of taxation, and this is a matter which so far as Kentucky is concerned, has had little attention. In the first place, there is no classification of land within the State for taxation purposes. It is a generally accepted theory among experts in this matter at the present time that there is only one fair method of taxation which may be applied to land maintained by the owner in forest growth and that is that there should be a tax placed on the land which shall be an annual tax, and another tax placed on the forest crop **when it is harvested.** In no other manner does it seem probable that reforestation of suitable areas throughout the State may be accomplished, since in the first place, on account of the character of the investment the owner of the land must be assured before hand just what his taxes on the land are to be, and in the second place the risks attendant upon the raising of a forest crop, because of the long period of years before it reaches maturity, make it essential that the crop of forest products shall be taxed at maturity when it is harvested, rather than that an annual tax shall be imposed. Certain States have already gone a long ways in this direction and Pennsylvania has recently passed three laws dealing with the matter of forest taxation and the classification of forest land which embrace the best features of recent thought on this subject. The essentials of the recent Pennsylvania laws are as follows:

1. Classification of suitable land set aside by the owner for forest purposes as auxiliary forest reserves.

2. Agreement with the State to maintain such land in forest growth and penalties for failure to carry out agreement.

3. Assessment of land classified as auxiliary forest reserves at $1.00 per acre annual tax.

4. Payment by owner of 10 per cent of the value of the forest products when harvested to the county to be distributed among the proper county funds.

5. Fixed charge on auxiliary forest reserve land of two cents per acre for schools and two cents per acre for roads.

Under these provisions it is obvious that the growing of timber on suitable areas would be reduced to a practical business basis.

Providing the tax question is sufficiently settled and definite for a period of years the regeneration of the woodlot or the establishment of one may be undertaken as a safe investment. So far as Kentucky is concerned, the present tax laws and the manner of handling the assessments in the counties are not such as to bear heavily on timbered or wooded areas. In the event that a new classification of land is made and new tax laws enacted every effort should be made to bring about such a classification of forest land and such a system of taxation as will encourage the reforestation of suitable areas and the regeneration of the present woodlands.

REGENERATION OF THE WOODLOT.

When the question of the regeneration of the woodlot is seriously considered there are several points which stand out prominently as follows:

1. Protection.
2. Taking of stock.
3. Removal of undesirable species.
4. Selection of desirable species.
5. Method of regeneration.
6. Care and management.

1. **Protection.** It is essential that a woodlot shall be protected if it is to be an asset to the owner and brings him financial returns. There are two destructive agencies against which he must make special efforts, fire and stock. It may seem unnecessary to point out the various bad effects which fire and stock have on woodlands, but they are nevertheless here set forth in brief. **Fire** destroys timber utterly, injures it so that it is subject to insect and fungi attacks, lowers the grade of the timber, destroys or seriously injures reproduction, destroys humus and lowers the productive capacity of the soil. There is no way in which burning over a woodland improves the character of the forest. **Stock** have a very injurious effect on trees, especially young growth. Some stock eat up the nuts and berries and seeds which are the means of reproducing the forest. Other stock browse on the young trees which have started, destroying the young growth altogether or seriously gnawing other trees thereby leaving them badly malformed and depleted in vitality. By rubbing against small trees stock also do a great deal of harm. So stock should be rigidly excluded from the woodlot, or at least until all the trees are well developed and even then no good is accomplished. If possible, the woodlot should be well feneed. The other destructive agencies against which protection may become necessary are insects and disease. If fire and stock are excluded, the chances of insects and disease doing serious damage is materially decreased. Diseases and insects are best kept in check by keeping the wooded area clean of dead and decaying material. In case of serious insect infeetation it may in some eases pay to spray the trees, but under ordinary conditions this is not practical. The common way of fighting disease and insects is to eut down and burn all affected trees.

2. **Taking of Stock.** The next step in the regeneration of our woodland is to find out the extent and character of the stock on hand, for we can not proceed intelligently without this knowledge. This taking of stock may be a purely ocular process or it may be a detailed estimate and description, depending on the extent of the woodland and the desires of the owner. All reproduction should be accounted for as well

as the older stock on hand. The taking of stock should also involve the division of species into desirable and undesirable species, by desirable species being meant such species as it is desired to encourage because of the demand for it in the local market or because of the use which may be made of it by the owner on his farm. The desirable species will usually include the fast growing species.

3. **Removal of Undesirable Species and Trees.** The first actual work in connection with the regeneration of the woodlot is the removal of undesirable species. When this is undertaken the local market and other markets should be carefully studied in order that, if possible, a sale may be found for the material which is removed, so that the work may pay for itself, In determining what are undesirable species there are several factors which will govern and no specific list of trees can be cited. The desire of the owner, the market for the material,, rapidity of growth and other features are among the important considerations. Such trees as blue beach, horn beam, red bud, service berry and others have no rightful place in a woodlot since they take up space without furnishing any product of value, unless the wooded area is desired for its aesthetic features. In a woodlot which is maintained for fence posts and fuel it would be poor policy to retain any but those species which make good fence post material and fuel and grow rapidly. In this matter, common sense will go a long way. Also badly suppressed trees, malformed and diseased or infected individuals should be removed as far as practicable.

4. **Selection of Desirable Species.** In the selection of desirable species there are a large number of considerations, and the first of these is the purpose of the owner in maintaining the wodlot. For instance, if the owner desires fence posts, and fencing material, his woodlot will, in Kentucky, be confined to those species which produce such material **quickly,** as for example black locust, catalpa, chestnut and walnut, also it will be well to have a percentage of red cedar (juniper) in the mixture, for since red cedar grows comparatively slowly, it may be reserved to be cut as the second crop and will serve to shade the ground and prevent erosion when the faster

growing species have been cut and during the restocking of the area. If fuel as well as fence post material is desired, a mixture including hickory, oak and chestnut would be desirable. If ties, posts, poles or other products are an object, certain species are desirable and are easily grown. A list of trees suitable for various purposes is herewith given. No species are included in this list which will not produce marketable material repeatedly within the lifetime of a single individual. Only in unusual cases is the raising of trees for lumber recommended as a feasible or profitable venture for the individual farm owner.

Fence posts and fencing material—Black locust, catalpa, chestnut, walnut, oak, red cedar (juniper).

Fuel—Oak, hickory, maple, chestnut.

Poles—Chestnut, catalpa, red cedar.

Ties—Black locust, catalpa, chestnut, walnut, oak.

Vehicle material and handle stock—Hickory.

5. **Methods of Regeneration.** There are several things which must be done to secure a good forest over the area. If natural seeding is to be depended upon for reproduction, the ground must be prepared to receive the seed. Sometimes the sod will be so thick over the area that seeds get no chance to generate. In this case, the sod should be plowed up, if possible, or harrowed so that the seeds may have a suitable opportunity to start. To do well, it is necessary that the seeds and seedlings have easy access to the mineral soil. It may be that the ground is so shaded that seedlings do not receive the necessary sunlight. If this be so, sufficiently large openings should be made in the forest cover to admit the required light. It may be that natural seeding does not proceed rapidly enough and that this must be supplemented by the sowing of seed artificially. When artificial sowing is resorted to it will be found that there are several methods of sowing which recommend themselves; broadcast, sowing in prepared rows, sowing in prepared seed spots and sowing with a corn planter either in rows or spots. This last method is recommended as being usually most satisfactory and economical. Sowing with a corn planter can be resorted to only in the case

of small seeds. Large seeds, such as walnuts, hickory nuts, etc., must be planted by hand, but when this is done they are liable to be eaten by squirrels or other rodents, in which case it may be necessary to plant such seeds in small protected seed beds and then transplant the seedlings to the place where they are desired.

If planting is to be depended upon for reforesting, the nursery stock obtained should be small seedlings not over one or two years old or transplants two to three years old. If the amount of planting to be done is large, it may be wise to start seed beds close to the ground where the planting is to be done and not to depend on commercial nurseries for stock.

6. **Care and Management.** It will be found that the care and management of the woodlot is relatively a simple matter after the forest is well established and that the character of the stock and the amount and quality of the products will improve materially with management. There are certain systems of management which recommend themselves for woodlots such as the (1) simple coppice (2) polewood coppice (3) coppice with standards or variations of these. The three methods here cited are briefly described.

Simple Coppice. This is a system of management wherein all the stand is cut and the restocking of the area is secured by sprouts from the old stumps. Under this system the stand should be cut at an age not to exceed twenty-five years and preferably about fifteen years, although this is usually impossible from a commercial standpoint. The cutting should be done in the late fall, winter or early spring. The stumps should be cut low, smooth and slanting so as to shed water and prevent decay. After a time under this system the sprouting capacity of the stump is greatly reduced and arrangement must be made to secure new individuals either by direct seeding or by planting.

Pole Wood Coppice. This system involves the leaving of certain trees until they reach the pole wood stage and are suitable for such products as ties, poles, etc. It is a favorite method of handling woodlots.

Pole Wood Standards. This system involves the leaving of a certain few trees until they are of large size. Such trees should usually be from the seed.

In the management of the woodland, it will be necessary to make several cuttings before the final cutting at the end of the rotation, usually one or two. A thinning may early become necessary to give the best specimens a better chance for growth. Sometimes two thinnings may be required. Often a thinning may be required to secure reproduction by opening up the forest cover and exposing the ground so that young growth may have the opportunity to get started.

In the final cutting, when all or the major part of the crop is cut, the material should be removed from the ground as rapidly as possible and the brush disposed of when practical. The disposal of brush will usually take the form of lopping the limbs from the tops and scattering them, so as to secure early decay of the waste material. Sometimes the brush may be advantageously piled and burned.

CONCLUSION.

No attempt has been made in this bulletin to deal exhaustively with the woodlot problem. The desire has been to point the way for the improvement of the woodlots in Kentucky. Individual cases deserve specific consideration, and only the main features of the proposition have been touched upon. The State Forester will cheerfully answer by mail all questions relating to this subject so far as it is possible to do so, and will give such personal advice and direction as the time at his disposal and the circumstances warrant. A list of books, bulletins and articles treating this subject is appended for those who desire to go more deeply into the matter than is possible in a publication of this character. The illustrations are from photographs loaned by the Forest Service, United States Department of Agriculture.

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